

REMARKS

The preceding amendment is respectfully submitted in response to the Office Action of May 21, 2003 on the above-identified application. Entry of the amendment is respectfully requested, as is a reconsideration of the claims as amended.

Claims 1 through 11 are pending in the application. In the action, all claims were rejected on both formal and prior-art grounds.

Turning now to page 2 of the action, claims 1 through 11 stand rejected under 35 U.S.C. §112, first and second paragraphs. Essentially, the Examiner's position is that the limitation "one-stage or multi-stage style" is not described in the specification. The preceding amendment to claim 1 eliminates this limitation, and replaces it with clearer language to the effect that "at least one vibrational vane which is fixed to a vibrating rod" vibrates in the plating bath. Support for this limitation runs through the specification and figures.

Claim 3 has also been amended to correct an obvious error. Entry of the amendments to claims 1 and 3 is respectfully requested.

Referring to page 3 of the action, claims 1 through 9 were rejected under 35 U.S.C. §103(a) as being unpatentable for obviousness over the teachings of U.S. Patent No. 6,123,815 to Omasa in views of those of U.S. Patent No. 4,461,680 to Lashmore.

The Omasa reference discloses an electroplating method in which all of (A) vibrationally stirring apparatus, (B) aeration apparatus, (C) apparatus for swinging electrode bar, and (D) apparatus for applying vibration to electrode bar are used in combination or simultaneously operated. That is, the object of the invention disclosed in the Omasa reference, which is to provide a plating method for surely and uniformly plating minute holes having a diameter of 0.2 mm or less, can be achieved only when the above four components (A) to (D) are

simultaneously operated, as shown in the Examples and Comparative Examples in the specification of the Omasa reference.

One of the objects of the present invention is to provide an electroplating method which can form a plating film having a micro-structured conductive pattern with high quality. However, another object of the present invention is to provide a plating method which can form a high-quality plating film having a micro-structured conductive pattern at high speed. Still another object of the present invention is to provide a plating method which can effectively form a high-quality plating film having a micro-structured conductive pattern by a relatively small apparatus. According to the present invention, the above objects are all achieved.

By way of contrast, the invention of the Omasa reference uses a combination of the above four components (A) to (D), particularly the aeration apparatus, which is indispensable, making the plating apparatus remarkably large in size compared to the apparatus of the present invention.

The Lashmore reference discloses a pulsed electroplating method in which a relationship among a pulse height (peak current density), base height (off time current density), "on" time and "off" time is present. However, it should be noted that the Lashmore reference does not suggest the plating target or the object to be plated of such a small size or micro-structured conductive pattern as that of the present invention. It should also be noted that the Lashmore reference does not suggest any application of his invention to such a method as that of the Omasa reference or the advantages of combining vibrational stirring and pulsed electroplating.

According to the present invention, as claimed in claims 1 through 9, a micro-structured conductive pattern with high quality can be obtained at high speed by a relatively

small apparatus. As can be seen in Examples 1 to 6 and Comparative Examples 1 to 6, if one of the vibrationally stirring and pulse current is not used, the object of the present invention cannot be achieved. Therefore, the combination thereof provides an unexpected effect even for the skilled artisan.

Claims 10 and 11 were rejected as being unpatentable for obviousness over the Omasa reference in view of the Lashmore reference, and further in view of the cited excerpt from the "Electroplating Engineering Handbook". This excerpt merely discloses a barrel used in electroplating, and does not show what is lacking in the combined teachings of the Omasa and Lashmore references noted above.

Accordingly, the present invention, as claimed in claims 1 through 11, is respectfully submitted to be neither shown nor suggested by the combined teachings of the Omasa and Lashmore references and the excerpt from the "Electroplating Engineering Handbook", as none of them shows or suggests the combination or vibrationally stirring and pulsed electroplating so as to make the present invention.

An early allowance of claim 1 through 11 is respectfully requested.

Respectfully submitted,



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